MOVEMENT OF STOCK PRICE AND TRADING VOLUME - A COMPARISON OF SHANGHAI AND SHENZHEN STOCK MARKET

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ABSTRACT

The relationship between stock price and trading volume in the Chinese stock market is studied. Six pieces of important political and economic news are identified and set up the time frame of the analysis. One major finding is that stock prices and trading volumes are independent to each other, implying a symmetric and non-segmented stock market. Also, there is a difference on the rate of information flows between the Shanghai and the Shenzhen Stock Exchanges. The result is opposite to the explanation of market size on information efficiency. Investors of the two exchanges have different interpretations on the same information. Political events exert more effects on foreign investors while economic events affect domestic investors more.

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CHAPTER I

INTRODUCTION

Many researches, both empirical and theoretical, on the relationship between stock price and trading volume have been conducted in the west, but few has been done on the Chinese stock market. To find out such relationship in the Chinese capital market, we collect data from two stock exchanges in Shanghai and Shenzhen and test them with the relevant theories. Whether these theories can explain the relationship depends on the structure of the market, different reactions from shareholders and other relevant factors. Six important political and economic pieces of news are identified as the time periods for analysis.

Karpoff (1987) identified that the main reason to study stock price and trading volume relationship, which was to provide insight into the structure of financial markets. Empirical evidences show that it can help discriminate among differing hypotheses about the market structure. It generally supports the mixture of distributions hypothesis that the distribution of rates of return appears random because the data are sampled from a mixture of distributions that have different conditional variances. Hence, data on stock price are generated by a conditional stochastic process with trading volume used as a proxy to determine a changing variance parameter. Such relationship will be useful for event studies by measuring changes in the variance of the stock price process from non-event to event time. Another finding

is that the stock price and trading volume relationship has critical implications for the futures market. The variability in stock price affects the trading volume in futures contract and hence the futures price. At the same time, the time to delivery of futures contract can affect the trading volume and hence the variability in stock price. As a result, this relationship can indicate the importance of private and public information in determining investors' demand.

Stock prices depend on the rate of information flow, the method of information dissemination, the size of the market and the existence of short sales constraints. Changes in stock prices are interpreted as the market evaluation of new information. Meanwhile, trading volumes denote the extent to which traders disagree on the meaning of the information as they revise the stock prices, together with the empirical distribution of stock prices. Trading volumes are usually used to infer whether an event has "information content" and whether investors' interpretations of the information are similar or different. Traders revise their demand prices before the market period according to idiosyncratic liquidity or speculative desires. Trading volumes also help examine the existence of dividend clienteles arbitrage around ex-dividend days, the effects of information uncertainty, and arbitrage activity. Furthermore, an increase in trading volume indicates that investors interpret the news (information) differently or that they interpret the information identically but with diverse prior expectations. Under an imperfect or costly market, trading volumes tend to be lower while information will persist for a longer time until the market clears all the demands motivated by such information. Simulation tests indicate that trading volume is the highest when investors are all optimists or all pessimists. From the model derived by Pfleiderer (1984), trading volume is a decreasing function of disagreement between investors. According to Karpoff (1987), trading volumes are

positive even in non-event periods because investors idiosyncratically revise their demand prices.

There is a positive correlation between absolute change in stock price and trading volume. According to Karpoff (1987), a possible explanation comes from the research into the distribution of speculative stock prices. Daily change in stock price of speculative assets seems to be uncorrelated with each other and symmetrically distributed, but the distribution is kurtotic relative to the normal distribution. It is because the daily change in stock price is sampled from a set of distributions with different variances. This is called the mixture of distributions hypothesis. The other explanation on the possible correlation is implied by the model developed by Pfleiderer. This model is an extension of the information aggregation in markets. It states that the noise introduced by life cycle trading causes private information aggregated by the market partially transmitted to speculators. They engage in speculative trading with the precision of private information, without correlation with the absolute change in stock price but the life cycle trading affects the supply of information to the investors. Therefore, the trading volume of life cycle trading randomly affects the magnitude of the change in stock price. In addition, the strength of the correlation between absolute change in stock price and trading volume increases with the relative importance of life cycle trading in the market. On the other hand, Karpoff discovered that the market size would affect the relationship between stock price and trading volume. In equity market, heavily traded issues are more likely to be optional in organized exchanges. Moreover, Tauchen and Pitt (1983) and Harris (1983) found that the relationship between stock price and trading volume is the strongest when the flow of information in the market is the most volatile. Pfleiderer (1984) argued that the strength of the relation increases as more trading

occurs for non-informational reasons such as liquidity and speculative desires. Combining the issues of margin constraints and short selling, Jennings, Starks, and Fellingham (JSF) provide an alternative explanation on the correlation between change in stock price and trading volume. They argue that taking a short position is more costly than a long position since the quantity demanded of an investor with a short position is less responsive to the change in stock price than the quantity demanded of an investor with a long position. They find that the trading volume for an uninformed trader who interprets the news pessimistically is less than a trader who is optimistic to the news. Since the stock price reduces with a pessimist while increases with an optimist, trading volume is relatively higher when the stock price increases than when the stock price declines. In other words, trading volume tends to be heavy in bull markets and light in bear markets.

Michael Long (1999)'s paper examines the market efficiency and the stock price and trading volume relationship in A Shares and B Shares on the Shanghai stock exchange relative to the shares in the U.S. However, he only collects 100 weekly data and provides no specification to any news effect. Weekly data are less reliable than daily data because the effect on news has already been deteriorated or disappeared after a week.

Therefore, since information arrival is important to the stock price and trading volume relationship, such analysis will be able to determine the extent of news effect on stock price and trading volume and hence, the market efficiency of stock markets. When the stock market is symmetric, there will be no Granger causality between the stock price and trading volume during news release, implying that there is no market segmentation. On the contrary, when the stock market is asymmetric, upon the arrival of news, there will be a strong Granger causality between stock price

and trading volume and vice versa.

The main purpose of this study is to examine whether there is any news effect on the stock prices and trading volumes. By collecting those data and applying relevant theories relating to stock prices and trading volumes, we can get the insight on the rate of information flows and the interpretation of information. Moreover, we determine if market size is a contributing factor to the information efficiency. In addition, we identify the possibility of market segmentation, in terms of the locations of the stock exchanges and the types of investors in Class A and B Shares. Finally, we explain the relationship between stock price and trading volume using three models described in the later sections.

CHAPTER II

THE CHINESE CAPITAL MARKET

Although China's communist government shut down the country's securities markets when it came to power in 1949, it began to experiment with bond markets in the mid-1980s, and with the shareholding system in Shanghai in 1984. Initially, eleven enterprises were transformed, one after another, from state-owned to shareholding enterprises. By 1990, the central government determined to establish stock exchanges.

Currently, China has two officially approved securities markets listing stocks: the Shanghai Securities Exchange, which opened on 19 December 1990; and the Shenzhen Stock Exchange, which opened officially on 3 July 1991.

China's leaders hoped these markets would become a major source of capital for the state enterprises. They also counted on the exchanges to attract the huge pool of savings of Chinese citizens so that these funds might be used to finance capital investment. Finally, the Beijing government hoped the efforts of Chinese enterprises to attract public funding would force them to increase productivity and boost profits.

The two exchanges, though established for similar purposes, are not identical in practice. Shenzhen Stock Exchange features more trade-oriented, joint venture companies and is more loosely regulated than the Shanghai exchange, which is dominated by large, formerly state-owned enterprises. The accounting practices of

the companies listed in the Shenzhen Stock Exchange are more in line with international norms. Those listed in the Shanghai Stock Exchange, on the contrary, feature lots of accounting imponderables and to certain extent are exposed to more political risk than Shenzhen shares, considering the Shanghai's traditional involvement in the Communist Party's fractional in-fighting.

At first, only Chinese citizens could trade stocks in Shenzhen and Shanghai. China's foreign exchange controls made it almost impossible for foreign investors to participate.

In February 1992, however, China permitted the issuing of B Shares to foreign investors. These shares are quoted in Renminbi but traded for foreign currencies and issue dividends in CIS or Hong Kong dollars. Most of the B Shares are owned by large foreign institutional investors such as mutual funds. A Shares, in contrast, may be bought and sold only by Chinese legal persons and individuals. They are usually owned by individuals. Both shares carry the same rights and are subject to the same obligations. Another important feature is the substantial difference in market size between A Shares and B Shares. As shown in the Appendix section, the trading volumes of A Shares are significantly greater than that of B Shares. Previous researches show that A Shares market will exhibit more liquidity and provide smoother information transfer of information than B Shares market. If the market size is important, we will expect A Shares market to be more efficient and exhibit low relationship between the stock price and trading volume.

B Shares are traded in non-scrip form. The registration and transfer of ownership is kept in computer accounts. After completion of registration and the transfer of ownership, a shareholder of B Shares will be issued a voucher as evidence of holding stocks. Such a voucher includes information such as stock account

number, name of individual or organization holding the stock, name of the stock, the amount of stocks being dealt, the date of registration and so on. These vouchers may not be used for circulation or mortgaging purposes.

The companies approved for listing appear to be of reasonable quality and have good prospects for successful earnings growth. Each company must go through three levels of review by the People's Bank of China (PBOC), the Economic Reform Council, and the commission of the relevant exchange before it is approved to list. The price-earnings (PE) ratio must be below 15 at the time of listing.

Foreign investors looking to buy B Shares must open an account with a clearinghouse in China through one of the approved foreign brokers authorized by the PBOC. The overseas broker channels each order to an associated local broker in Shenzhen or Shanghai. The local broker then records the order in the stock exchange's central order matching system. Settlement takes place three days after the day of trade (T+3).

Concerning the Shanghai Stock Exchange, since stock options, futures and short selling are prohibited, we expect the relationship between stock price and trading volume to be stronger for both class of shares in Shanghai than in Shenzhen. According to Karpoff's (1988) costly short sales hypothesis, markets with greater restrictions on short selling and options trading will show stronger relationship between stock price and trading volume than markets with fewer restrictions.

The purpose of splitting the stock market into two classes of shares is explained by Bailey and Jagtiani (1994). They found out, in their research of the Thai capital market, that differences in the supply of shares available, tighter ownership restrictions, greater liquidity and greater information to foreign investors cause a difference in stock prices demanded by domestic and overseas investors. Therefore,

there is a need to segment the two distinct groups of investors into trading two different classes of shares.

In February 2000, the total market capitalization of the Shenzhen Stock Exchange exceeded RMB1,561,826 million, of which almost 99% are A Shares (RMB1,545,223 million) and the remaining B Shares (RMB16,603 million). In the Shanghai Stock Exchange, the total market capitalization reached RMB18,419,975 million. Of this total, the capitalization of A Shares made up more than 99%, amounting to RMB18,279,090 million and that of B Shares is RMB140,885.

CHAPTER III

DATA AND METHODOLOGY

To analyze the relationship between stock prices and trading volumes, we first set the time frame to be after Mr. Tang Xiao-ping's death, i.e. from March 1997 to Feb 2000. Then, the analysis is bound to the periods of six important political or economic news of China. It is vital to look at the stock prices and trading volumes before and after each event and thus, we set the analysis period to be one month before and after each event. Daily data of the stock market indexes for both markets and classes of shares are collected through Datastream, newspapers, magazines and direct visit to the Shenzhen Stock Exchange. After the data are collected, we use Eviews Software to analyze them by first inputting the data collected (e.g. Shanghai A-share market) into this program. It then generates the analysis on the data and provide the tests on several models. In the next section, we describe six important political or economic pieces of news followed by introducing three models for our analysis.

Cases Description

For our analysis, we have identified six important political or economic pieces of news as below:

Event 1: Hong Kong Handover (1 July 1997)

After 156 years of colonial rule, Britain returned one of the world's most dynamic capitalist societies---Hong Kong---to the control of the world's largest Communist country, China, at midnight 6 June 1997. The post-colonial Hong Kong is called a Special Administrative Region of China, and would have a high degree of autonomy from Beijing for a period of 50 years during which the territory would be allowed to continue with its distinctive laissez faire system. "The Hong Kong residents shall enjoy various rights and freedoms according to law," promised Chinese President Jiang Zemin at the new Hong Kong convention center. The Basic Law, Hong Kong's mini-constitution, guarantees that the territory will continue to be governed in much the same way under Chinese rule as it was during the British administration. It outlines the basis for Deng Xiaoping's "One Country - Two Systems" principle and enshrines in law people's freedoms.

Even before China took control of Hong Kong and it 6.3 million people, a detachment of 500 soldiers in the People's Liberation Army arrived at the Prince of Wales Barracks in the heart of Hong Kong's Central business district. A larger contingent of 4,000 troops began arriving by land, sea and air just six hours after the midnight handover.

Event 2: Zhu Rongji Elected the Prime Minister (8 March 1998)

It was announced at the ninth National People's Congress on 5 March 1998 that Zhu Rongji was to replace Li Peng as China's Prime Minister. Then 69-year-old

Mr. Zhu would have the task of steering China's economy through one of the most difficult phases of its transaction to a more market-oriented economy. He must oversee the restructuring of most of the 370,000 state-owned enterprises---many losing money and heavily in debt---within a self-imposed deadline of three years. He must also reinvigorate a state banking system paralyzed by bad debts amounting to roughly 25% of assets, again within three years. Mr. Zhu was popular with the public because, as Mayor of Shanghai in 1989, he was credited with pacifying demonstrators without resorting to force. His skill at capping debt and inflation, while bringing China's double-digit growth down to more manageable levels, won him the admiration of central bankers and foreign investors.

Event 3: U.S.-China Summit (25 June 1998)

U.S. President Bill Clinton set foot in China's Tiananmen Square on 25 June 1998, becoming the first US head of State to visit the site since the army crushed pro-democracy protests in 1989. In every major public address the US President made during his nine-day five-city tour, he stressed that China could no longer be ignored as an economic entity and that the US would work with it to maintain financial stability in Asia. He also re-stated Washington's "Three Nos" policy on Taiwan that there should be no support for a "one Taiwan, one China" position, for independence for Taiwan, and for Taiwan's membership in the United Nations. The U.S. and China agreed to no longer target each other's cities with nuclear missiles. In a joint statement, the leaders also agreed to continue regular US-China summit meetings. On human rights, the most contentious issue of Mr. Clinton's trip, both sides affirmed their commitment to the promotion and protection of human rights and fundamental

freedoms.

It is commonly believed that Mr. Clinton's trip, which followed Mr. Jiang Zemin's official visit to the US last autumn, had deepened the American people's understanding of China.

Event 4: The Chinese Embassy Bombing in Yugoslavia (8 May 1999)

NATO warplanes hit the Chinese embassy in Belgrade shortly before midnight on 7 May 1999, killing three people, leaving one person missing and wounding 21 people. NATO and the U.S. expressed their deep regret over the bombing which they called a "tragic mistake" soon after the hit. It was said that the three NATO guided bombs struck precisely at the coordinates programmed into them but it was not the building NATO believed it to be. The Beijing Government condemned the attack as a violation of international law and the U.S.-led NATO must assume all responsibility. In China itself, thousands of students protested at the U.S. embassy in Beijing and Shanghai, accusing NATO and the U.S. of murdering and violating the Chinese sovereignty.

Despite the strong protest, NATO said they would continue its air campaign in pursuit of its goals: to halt a Yugoslav program of ethnic cleansing and to ensure the safe return home of thousands of Albanian refugees who had been displaced from their homes.

Event 5: China's WTO Entry (15 November 1999)

China and the U.S. signed on 15 November 1999 a bilateral agreement,

which was expected to pave the way for China's WTO entry. After six days' of tense, difficult negotiations, the final document, the Bilateral Agreement between the Government of the People's Republic of China and the Government of the United States of America on China's Accession to the World Trade Organization, was signed by U.S. Trade Representative Charlene Barshefsky and Chinese Trade Minister Shi Guangsheng at the Ministry of Foreign Trade and Economic Cooperation at 1:30 p.m. The WTO deal would help accelerate the process of China's accession to WTO and the development of China-US economic cooperation and trade relations. By joining the WTO, China had committed to a set of rules that it would not be able to backtrack from and that would push China's reform forward much quicker than otherwise. The rules included reducing its average import duties to 17 percent from 22.1 percent, eliminating export subsidies, and lowering tariffs on farm goods. U.S. firms would be granted access to China's distribution networks and auto companies would be permitted to offer vehicle financing. The deal would also benefit banks, insurers and telecom companies since China would have to open these markets for foreign competitors.

Event 6: Macau Handover (20 December 1999)

The Portugal handed Macau, the tiny gambling enclave, back to China at midnight, 19 December 1999, ending 442 years of colonial rule. Like Hong Kong, Macau is now a "Special Administrative Region" of China, with considerable local autonomy for at least 50 years under "one country, two systems" arrangement. Chinese President Jiang Zemin, speaking at a ceremony launching the new Macau, promised residents their freedoms would be safe and their unique culture would be

respected. Macau would retain its capitalist ways---and its gambling-dominated economy---although external matters such as foreign affairs and defense would be handled by Beijing. "After successfully resolving the issues of Hong Kong and Macau, Beijing now seeks an early settlement of the Taiwan question and the complete national reunification in accordance with the 'one China' principle," said Jiang.

Attention was also paid to the 500 Chinese People's Liberation Army soldiers who rolled into Macau in armored vehicles at noon the following day. Many Macau citizens hoped the troops would help deter warring triad gangs that had scared away tourists and killed at least 37 people during the past year alone. Unlike Hong Kong, Chinese troops could be called upon to intervene in matters of internal security in Macau.

Three Models

Three models are used to test the relationship between stock prices and trading volumes. We first examine the random walk process with drift. There are two popular models available for testing the time series. They include Augmented Dickey-Fuller (ADF) Unit Root Test and the Phillips-Perron (PP) Unit Root Test. Both of them use different methods to control for higher-order serial correlation in the time series.

The ADF Unit Root Test can examine the random walk process with drift. It makes a parametric correction for higher-order correlation by assuming that the PRICE series follows an autoregressive process and adjusting the test methodology. Moreover, it controls for higher-order correlation by adding lagged difference terms

of the dependent variable PRICE to the right-hand side of the regression:

$$\Delta PRICE_t = a + b \cdot PRICE_{t-1} + e_t$$

where $\Delta PRICE_t$, a, b, $PRICE_{t-1}$ and e_t are the change in stock price at time t, a constant variable, t-statistic, stock price at time t-1 and stationary random disturbance term called drift respectively.

This augmented specification is then used to test:

$H_0: b = 0, H_1: b < 0$

in this regression. Fuller discovered that the asymptotic distribution of the t-statistic on b is independent of the number of lagged first differences included in the ADF regression. Furthermore, Said and Dickey (1984) demonstrated that the ADF Unit Root Test remains valid even when the time series has a moving average component, provided that enough lagged difference terms are augmented to the regression. On the other hand, if we include a constant in the test regression and the unit root is nonzero, the t-statistic will have an asymptotic standard normal distribution under the null hypothesis of a unit root. Fortunately, Hylleberg and Mizon (1989) had shown that the standard normal critical values are likely to lead to too frequent rejection of the null hypothesis even in large samples, unless the constant is very large. They presented critical values for selected sample sizes and various positive values for the constant parameter a. Their critical values lied between the Dickey-Fuller values and those from the standard normal distribution. When the value of a becomes smaller, the critical values become closer to the Dickey-Fuller values. Therefore, their recommendation was to use the Dickey-Fuller values rather than those from the standard normal distribution for moderate sample sizes.

One common problem is to decide whether to include a constant, a constant and a linear trend, or neither in the test regression. A possible solution is to run the

test with both a constant and a linear trend. However, adding irrelevant regressors in the regression will reduce the power of the test by concluding that there is a unit root when, indeed, there is none. To avoid such situation, Hamilton (1994a) recommended selecting a specification that is a plausible description of the data under both the null and alternative hypotheses (Hamilton 1994a, p.501). We should include both a constant and trend in the test regression if the time series contains a trend, deterministic or stochastic. If the time series does not show any trend and has a nonzero mean, we should only include a constant in the regression. Finally, if the time series is fluctuating around a zero mean, we should include neither a constant nor a trend in the test regression.

To test whether stationary series exists, we convert the data to change in stock price and change in trading volume with one day time lag and then put into the ADF Unit Root Test. It is essential to notice that a time series is called stationary if the mean and auto-covariances of the series are not time dependent. On the contrary, any series that is not stationary will be considered as non-stationary. A typical example of a non-stationary series is the random walk process with drift:

$$PRICE_t = PRICE_{t-1} + e_t$$

where $PRICE_t$, $PRICE_{t-1}$ and e_t are stock price at time t, stock price at time t-1 and stationary random disturbance term called drift respectively. The series $PRICE_t$ has a constant forecast value, conditional on the time t, and the variance is increasing over time. The random walk is a difference stationary series because the first difference of $PRICE_t$ is stationary, i.e.:

$$PRICE_t - PRICE_{t-1} = e_t$$

Such series should be integrated and is denoted as I (d) where d is the order of integration that contains the number of unit roots in the series or the number of

differing operations it takes to make the series stationary. Random walk has one unit root and hence it is an I (1) series. Similarly, a stationary series is I (0).

The second model is the Phillips-Perron (PP) Unit Root Test.

Phillips and Perron (1988) proposed a non-parametric method of controlling for higher-order serial correlation in a series. The test regression for the Phillips-Perron (PP) test is the autoregressive process:

$$\Delta PRICE_t = c + d \cdot PRICE_{t-1} + e_t$$

where $\Delta PRICE_t$, c, d, $PRICE_{t-1}$ and e_t are the change in stock price at time t, a constant variable, t-statistic, stock price at time t-1 and stationary random disturbance term called drift respectively.

Although the ADF Unit Root Test corrects for higher order serial correlation by adding lagged difference terms on the right-hand side, the PP Unit Root Test makes a correction to the t-statistic of the b coefficient from equation (1) above to account for the serial correlation in E. The correction is nonparametric since we use an estimate of the spectrum of E at frequency zero that is robust to heteroscedasticity and autocorrelation of unknown form. As a result, it will be useful for testing the random walk with drift but a more reliable test than ADF Unit Root Test because it can check heteroscedasticity and non-normality.

To test the relationship between the change in stock price and the change in trading volume, we use the Pairwise Granger Causality Test that will determine whether a price change will cause a volume change, and vice versa. The Granger (1969) approach of whether PRICE causes VOLUME is to see how much of the current VOLUME can be explained by past values of VOLUME and then whether adding lagged values of PRICE can improve the explanation. VOLUME is said to be Granger-caused by PRICE if PRICE helps in the prediction of VOLUME, or

equivalently if the coefficients on the lagged PRICE are statistically significant. There may exist two-way causation, that is, PRICE Granger causes VOLUME and VOLUME Granger causes PRICE. However, it is essential to notice that the statement "PRICE Granger causes VOLUME" does not imply that VOLUME is the effect or the result of PRICE. Granger causality measures precedence and information content but does not by itself indicate causality in the more common use of the term.

Generally speaking, it is better to use more rather than fewer lags because the theory is couched in terms of the relevance of all past information. So, we choose a lag length 4 that corresponds to reasonable beliefs about the longest time over which one of the variables could help predict the other.

CHAPTER IV

EMPIRICAL RESULTS

TABLE 1

STOCK PRICES USING AUGMENTED DICKEY-FULLER (ADF) UNIT ROOT TEST

Variables	t-statistic	Variables	t-statistic	Variables	t-statistic	Variables	t-statistic
SHA_1	-2.1959	SHB_1	-2.6419	ZHA_1	-2.3313	ZHB_1	-2.9129
SHA_2	0.5885	SHB_2	-4.2237*	ZHA_2	0.1635	ZHB_2	-6.6044*
SHA_3	-2.9005	SHB_3	-3.6420	ZHA_3	-2.7225	ZHB_3	-2.7717
SHA_4	-1.1583	SHB_4	-1.7190	ZHA_4	0.9406	ZHB_4	0.0582
SHA_5	-3.3333	SHB_5	-1.6751	ZHA_5	-3.6101	ZHB_5	-1.8796
SHA_6	-2.3564	SHB_6	-3.3445	ZHA_6	-2.0537	ZHB_6	-2.6560

* With 1% level of significance

Notes: SHA_n stands for Shanghai A Shares for event n; SHB_n stands for Shanghai B Shares for event n; ZHA_n stands for Shenzhen A Shares for event n; ZHB_n stands for Shenzhen B Shares for event n.

TABLE 2

TRADING VOLUMES USING AUGMENTED DICKEY-FULLER (ADF) UNIT ROOT TEST

Variables	t-statistic	Variables	t-statistic	Variables	t-statistic	Variables	t-statistic
SHA_1	-3.1696	SHB_1	-3.9355	ZHA_1	-2.8690	ZHB_1	-3.2336
SHA_2	-0.4490	SHB_2	-4.7545*	ZHA_2	0.3614	ZHB_2	-9.4912*
SHA_3	-2.7381	SHB_3	-4.2793*	ZHA_3	-2.0473	ZHB_3	-1.3980
SHA_4	-4.2833*	SHB_4	-2.6681	ZHA_4	-1.6744	ZHB_4	-1.0089
SHA_5	-3.4282	SHB_5	-3.4041	ZHA_5	-3.2927	ZHB_5	-2.6663
SHA_6	-5.9509*	SHB_6	-2.7469	ZHA_6	-2.9702	ZHB_6	-3.3477

* With 1% level of significance

Table 1 and 2 show the results of ADF Unit Root Test for stock prices and trading volumes respectively. Most of them are found to be insignificant at 1% level. Therefore, we cannot reject the null hypothesis that the time series follows a random walk process with drift. However, some of them are significant enough to reject the null hypothesis. Considering the second news, for instance, both stock prices and trading volumes on B Shares for both markets are proved to successfully reject the null hypothesis, suggesting that there are strong news effects on both markets. In addition, such large contrast with A Shares clearly indicates the presence of market segmentation. One possible reason is that B Shares investors are more informed than A Shares investors, implying greater market efficiencies.

TABLE 3

STOCK PRICES USING PHILLIPS-PERRON (PP) UNIT ROOT TEST

Variables	t-statistic	Variables	t-statistic	Variables	t-statistic	Variables	t-statistic
SHA_1	-2.0923	SHB_1	-2.4348	ZHA_1	-2.3524	ZHB_1	-2.2219
SHA_2	0.5157	SHB_2	-3.0814	ZHA_2	0.1164	ZHB_2	-3.5927
SHA_3	-2.9148	SHB_3	-2.5955	ZHA_3	-3.0173	ZHB_3	-2.3014
SHA_4	-0.9579	SHB_4	-1.4892	ZHA_4	-0.8361	ZHB_4	0.5476
SHA_5	-4.3702*	SHB_5	-1.5801	ZHA_5	-4.5427*	ZHB_5	-2.0288
SHA_6	-1.8674	SHB_6	-2.6088	ZHA_6	-1.6115	ZHB_6	-2.7200

* With 1% level of significance

TABLE 4

TRADING VOLUMES USING PHILLIPS-PERRON (PP) UNIT ROOT TEST

Variables	t-statistic	Variables	t-statistic	Variables	t-statistic	Variables	t-statistic
SHA_1	-4.0304	SHB_1	-6.3326*	ZHA_1	-3.8626	ZHB_1	-5.0738*
SHA_2	-1.9311	SHB_2	-4.9327*	ZHA_2	-1.6860	ZHB_2	-4.8276*
SHA_3	-3.3403	SHB_3	-3.8104	ZHA_3	-2.6018	ZHB_3	-0.6997
SHA_4	-5.0549*	SHB_4	-2.6629	ZHA_4	-1.7980	ZHB_4	-1.2752
SHA_5	-4.2611*	SHB_5	-4.6567*	ZHA_5	-4.5949*	ZHB_5	-3.1345
SHA_6	-8.4980*	SHB_6	-3.0030	ZHA_6	-2.3982	ZHB_6	-4.5939*

* With 1% level of significance

Table 3 and 4 contain the result of PP Unit Root Test for stock prices and trading volumes respectively. Considering Table 3 alone, we fail to reject the null hypothesis that the time series follows a random walk process with drift, except the fifth news for A Shares. In this case, the entry of China into WTO has a strong news effect on domestic investors who are enthusiastic and optimistic to the news. Looking at Table 4, more time series are able to reject the null hypothesis of market efficiency, indicating that there is large disagreement among traders on the meaning of the information, especially on the first and sixth news. The results on B Shares for both first and second news also indicate that the news has an effect on the trading volumes due to different prior expectations. An interesting result can be found on the fourth

news. Particularly, it rejects the null hypothesis, according to Shanghai A Shares only, revealing different rates of information flow in the two markets.

Compared with ADF Unit Root Test, the results from PP Unit Root Test are more consistent for trading volumes than for stock prices. To judge the results from both tests, we prefer PP Unit Root Test because it is more robust, reliable, and able to check heteroscedasticity and assume normality.

TABLE 5

CHANGES IN STOCK PRICES USING AUGMENTED DICKEY-FULLER (ADF) UNIT ROOT TEST

Variables	t-statistic	Variables	t-statistic	Variables	t-statistic	Variables	t-statistic
SHA_1	-3.4981	SHB_1	-5.1045	ZHA_1	-4.1086	ZHB_1	-4.0356
SHA_2	-4.9309	SHB_2	-4.7110	ZHA_2	-5.5485	ZHB_2	-5.7828
SHA_3	-3.9162*	SHB_3	-5.0529	ZHA_3	-3.9443*	ZHB_3	-3.7304*
SHA_4	-4.9710	SHB_4	-6.4626	ZHA_4	-5.2083	ZHB_4	-5.4521
SHA_5	-6.3571	SHB_5	-4.1548	ZHA_5	-5.9897	ZHB_5	-4.0595*
SHA_6	-3.7473*	SHB_6	-4.3402	ZHA_6	-3.6725*	ZHB_6	-5.6330

* Insignificant at 1% critical level

TABLE 6

CHANGES IN TRADING VOLUMES USING AUGMENTED DICKEY-FULLER (ADF) UNIT ROOT TEST

Variables	t-statistic	Variables	t-statistic	Variables	t-statistic	Variables	t-statistic
SHA_1	-5.6000	SHB_1	-7.1931	ZHA_1	-7.3475	ZHB_1	-6.1284
SHA_2	-6.7979	SHB_2	-5.1044	ZHA_2	-7.0719	ZHB_2	-7.6494
SHA_3	-5.6890	SHB_3	-5.7496	ZHA_3	-5.7234	ZHB_3	-2.1350*
SHA_4	-5.7385	SHB_4	-5.0449	ZHA_4	-3.5657*	ZHB_4	-5.4227
SHA_5	-6.1394	SHB_5	-6.9753	ZHA_5	-5.6402	ZHB_5	-5.3469
SHA_6	-10.6602	SHB_6	-5.0253	ZHA_6	-3.3671*	ZHB_6	-5.8344

* Insignificant at 1% critical level

Table 5 and 6 represent the results of ADF Unit Root Test for the change in stock price and change in trading volumes respectively. The test can help determine whether stationary series exists or not. Except for the third, fifth and sixth news, most of the results can significantly reject the null hypothesis showing that stationary series exists.

TABLE 7

RESULT OF GRANGER CAUSALITY TEST

H_0: Change in Stock Price does not cause Change in Trading Volume

Variables	F-statistic	Variables	F-statistic	Variables	F-statistic	Variables	F-statistic
SHA_1	2.1448	SHB_1	0.1017	ZHA_1	0.6890	ZHB_1	0.6769
SHA_2	2.4753	SHB_2	0.4994	ZHA_2	3.0463	ZHB_2	0.3522
SHA_3	0.2638	SHB_3	1.0085	ZHA_3	0.7988	ZHB_3	0.5018
SHA_4	1.5179	SHB_4	2.9106	ZHA_4	0.6121	ZHB_4	9.9302
SHA_5	2.0203	SHB_5	0.1579	ZHA_5	0.7494	ZHB_5	1.2398
SHA_6	3.2007	SHB_6	1.0518	ZHA_6	2.4153	ZHB_6	0.8569

TABLE 8

RESULT OF GRANGER CAUSALITY TEST

H_0: Change in Trading Volume does not cause Change in Stock Price

Variables	F-statistic	Variables	F-statistic	Variables	F-statistic	Variables	F-statistic
SHA_1	9.5326	SHB_1	0.3904	ZHA_1	3.5776	ZHB_1	2.2171
SHA_2	5.7933	SHB_2	2.0657	ZHA_2	3.4198	ZHB_2	0.9509
SHA_3	1.6881	SHB_3	0.8938	ZHA_3	2.4210	ZHB_3	1.8335
SHA_4	0.4489	SHB_4	2.0592	ZHA_4	5.3693	ZHB_4	0.3355
SHA_5	0.6410	SHB_5	0.0953	ZHA_5	2.0445	ZHB_5	1.3371
SHA_6	7.9054	SHB_6	0.6234	ZHA_6	1.1347	ZHB_6	0.5263

Combining the results from Table 7 and Table 8, we fail to reject the hypothesis that change in stock price does not Granger cause change in trading volume, and vice versa. In other words, stock prices and trading volumes are independent to each other during each period. Based on this information, we can conclude that both stock exchanges are symmetric and hence no market segmentation occurs, even between A Shares and B Share in the same stock exchange.

CHAPTER V

CONCLUSION

We identify six important political or economic pieces of news and examine the relationship between stock prices and trading volumes using three models, namely ADF Unit Root Test, PP Unit Root Test and Pairwise Granger Causality Test. We perform ADF Unit Root Test and PP Unit Root Test for the hypothesis that the time series follows the property of random walk with drift. It is found that the second and fifth news contributes to the changes in stock prices and trading volumes. However, we are surprised that both tests may not be totally consistent. To judge, we rely on the PP Unit Root Test which provides a more reliable result because it can check heteroscedasticity and assume normality. The results prove that news effect exists, even though both A Shares and B Shares are subject to the same economic conditions and governmental controls. B Shares investors are more informed than A Shares investors. This result is opposite to the explanation of market size on information efficiency and hence market size is not a contributing factor to this case.

On the other hand, we find most of the time series follows the pattern of stationary series, with few exceptions. The stock prices and trading volumes do not exhibit any Granger Causality, meaning that they are independent during each news period. As a result, it can be concluded that both stock exchanges are symmetric and no market segmentation occurs, in terms of the locations of the stock exchanges and

the types of investors in A Shares and B Shares. It is interesting to notice that Karpoff's costly short sales hypothesis is not applicable to the situation in both stock exchanges, even though options, futures and short selling are prohibited.

Moreover, there is a difference on the rate of information flows between the Shanghai and the Shenzhen exchanges. Investors of the two exchanges have different interpretations on the same information. Political event (e.g. the second news) exerts more effects on the overseas investors while economic event (e.g. the fifth news) affects the domestic investors more.

Finally, it has to be kept in mind that the three models we used are inadequate to explain all the factors. Some factors such as liquidity and speculative motives should be taken into consideration before making the final evaluation.

APPENDIX 1

STOCK PRICE AND TRADING VOLUME IN THE SHANGHAI AND THE SHENZHEN STOCK EXCHANGES ONE MONTH BEFORE AND AFTER THE HONG KONG TURNOVER

	Shanghai A shares		Shanghai B shares		Shenzhen A shares		Shenzhen B shares	
Date	Price (RMB)	Volume	Price (US$)	Volume	Price (RMB)	Volume	Price (US$)	Volume
5/30/97	1341.86	3726509	86.867	86088	443.908	5388180	153.073	65560
6/2/97	1395.34	5916989	90.045	207507	466.518	8199210	160.257	99910
6/3/97	1397.79	6599264	90.513	210129	469.895	9651470	159.339	97990
6/4/97	1422.07	6786655	90.076	142121	474.169	7973320	158.806	84650
6/5/97	1421.44	5665485	89.206	134406	472.495	7288840	156.771	51630
6/6/97	1331.94	8697908	85.337	242858	440.215	12694860	150.769	93310
6/9/97	1331.17	3272649	86.148	86711	445.653	7163200	150.769	#N/A
6/10/97	1295.91	2543507	85.321	120454	426.448	5970570	147.113	116740
6/11/97	1274.09	3366729	82.797	177585	414.737	7215830	142.36	60210
6/12/97	1265.84	2684556	82.918	150992	412.91	4830500	143.322	77810
6/13/97	1298.92	4222216	83.931	183903	431.088	6999470	146.159	58040
6/16/97	1317.13	4579358	85.219	129332	443.121	8061800	149.118	69420
6/17/97	1301.12	3057923	83.707	476037	434.401	6486810	149.7	61080
6/18/97	1287.16	3052695	83.08	163176	428.295	7048550	146.62	43280
6/19/97	1285.01	2891891	83.225	135074	421.6	5111110	146.627	44920
6/20/97	1349.15	4536487	85.047	173043	449.968	9285760	149.147	74470
6/23/97	1340.68	5883835	85.481	172714	450.402	14526020	148.265	91370
6/24/97	1362.87	3920488	84.944	123900	463.588	9979010	146.938	54180
6/25/97	1356.72	4203865	83.457	141957	463.21	9175500	144.531	98800
6/26/97	1343.2	3707218	82.129	297993	460.088	9415770	143.803	71660
6/27/97	1306.78	5305870	81.478	196692	449.425	11515900	144.715	113300
6/30/97	1306.78	#N/A	81.478	#N/A	449.425	#N/A	144.715	#N/A
7/1/97	1306.78	#N/A	81.478	#N/A	449.425	#N/A	144.715	#N/A
7/2/97	1253.01	3728680	78.69	86104	431.12	7760440	144.715	#N/A
7/3/97	1202.28	3532914	75.776	120013	408.265	6566520	135.97	56780
7/4/97	1211.45	4231333	76.225	116473	411.623	5685560	135.401	46670
7/7/97	1145.25	3350385	74.145	90386	378.347	4824470	127.688	53090
7/8/97	1160.24	3480798	71.304	124516	382.266	5326280	121.304	308560
7/9/97	1171.2	3044333	73.726	92355	387.437	4681900	120.437	100800
7/10/97	1169.99	3042297	74.841	145293	380.332	4416460	125.595	101870
7/11/97	1206.86	3760443	75.851	105136	398.215	5644620	132.365	93470
7/14/97	1239.26	5335782	77.373	90458	411.017	7827890	134.249	77450
7/15/97	1254.72	5356159	77.332	85672	413.229	6981070	132.812	59600
7/16/97	1244.91	5035302	76.966	#N/A	409.592	7103920	132.727	41690
7/17/97	1252.01	4390603	76.966	74100	415.129	6781740	133.635	47440
7/18/97	1265.61	4593867	76.369	86800	419.635	7747810	133.169	46900
7/21/97	1248.55	4767927	75.28	55763	415.487	7367840	132.568	28910
7/22/97	1264.56	4398839	74.839	54088	422.403	5409550	132.097	37390
7/23/97	1254.62	4621013	74.522	86174	421.209	7698010	133.334	46790
7/24/97	1227.93	3102127	74.999	#N/A	410.421	5224440	132.584	35830
7/25/97	1224.04	2868753	75.634	121244	408.124	5847370	131.267	32160
7/28/97	1193.4	2876942	74.285	80924	394.461	5007540	130.034	35140
7/29/97	1206.06	2869951	73.495	66521	397.152	4132700	129.699	27170
7/30/97	1234.46	3474303	72.931	82533	407.724	4602350	130.041	41650
7/31/97	1245.58	3539121	72.903	84278	407.494	4390810	129.605	45600
8/1/97	1248.48	3057006	73.79	81199	409.458	3773420	130.857	67670

#N/A: Not available

APPENDIX 2

STOCK PRICE AND TRADING VOLUME IN THE SHANGHAI AND THE SHENZHEN STOCK EXCHANGES ONE MONTH BEFORE AND AFTER ZHU RONGJI ELECTED THE PRIME MINISTER

	Shanghai A shares		Shanghai B shares		Shenzhen A shares		Shenzhen B shares	
Date	Price (RMB)	Volume	Price (US$)	Volume	Price (RMB)	Volume	Price (US$)	Volume
2/5/98	1293.78	#N/A	46.926	#N/A	410.443	#N/A	84.694	#N/A
2/6/98	1293.78	#N/A	46.926	#N/A	410.443	#N/A	84.694	#N/A
2/9/98	1318.64	3891390	51.552	221935	418.784	3533100	93.175	94800
2/10/98	1304.34	4067855	55.611	895671	414.646	3888000	98.973	338900
2/11/98	1319.77	3908483	54.192	393416	418.014	3515900	97.781	109200
2/12/98	1314.96	4136013	55.395	375286	416.462	4459000	97.152	71900
2/13/98	1315.63	3719035	53.064	225957	416.767	3514000	93.703	66000
2/16/98	1305.44	4224931	52.608	152295	415.976	3990100	91.154	52400
2/17/98	1307.42	3165882	53.577	170306	416.448	3216500	92.573	53700
2/18/98	1298.23	4398240	53.287	112948	414.399	3396400	92.872	38800
2/19/98	1300.69	2989650	54.367	225072	414.244	2787400	94.221	71900
2/20/98	1293.34	2876346	54.972	152272	410.734	3357400	94.201	43200
2/23/98	1274.55	3393932	55.084	238155	405.689	3173400	94.316	26000
2/24/98	1272.62	2730930	58.379	526542	402.583	2688900	98.075	100300
2/25/98	1258.4	2777800	57.62	477537	397.334	2743500	97.932	83000
2/26/98	1271.23	2657613	57.793	302139	402.381	2545700	97.523	46300
2/27/98	1270.64	3020114	58.734	339134	399.06	2578300	97.94	82800
3/2/98	1250.88	4380915	59.073	255229	385.338	3471500	96.97	54200
3/3/98	1265.98	3277571	57.779	180218	390.563	2407200	96.065	34200
3/4/98	1278.56	3308477	57.243	179570	392.817	2330800	96.204	35300
3/5/98	1273.53	2895507	54.817	272586	390.429	2192600	94.104	68900
3/6/98	1272.35	2860898	54.835	152657	389.68	2134800	94.637	45400
3/9/98	1266.33	2946745	54.794	78533	386.885	2147700	94.979	35600
3/10/98	1264.73	2621459	55.925	232078	387.794	2265300	94.782	64900
3/11/98	1254.36	3371114	55.566	168249	384.506	2727700	95.874	51700
3/12/98	1242.68	2234401	55.082	160031	381.426	2507400	95.529	36100
3/13/98	1248.54	2053242	56.343	200543	386.117	2410600	95.506	37400
3/16/98	1252.31	2721507	56.386	213749	390.866	3023900	96.588	53300
3/17/98	1268.08	3374667	55.663	216208	396.306	3286400	96.963	38400
3/18/98	1258.32	3292024	56.011	244972	391.965	3256700	96.351	44000
3/19/98	1252.96	3056999	55.532	226434	389.785	2647400	96.03	65800
3/20/98	1251.56	2565069	55.724	144387	388.855	2618400	96.442	85200
3/23/98	1243.69	3237533	54.992	90702	386.217	2631600	95.717	25700
3/24/98	1258.87	3138931	55.075	103768	390.801	2501400	95.211	37500
3/25/98	1256.18	3849837	55.159	123632	390.51	3590900	95.057	52400
3/26/98	1253.64	4259590	54.383	142906	388.363	3399500	94.737	81500
3/27/98	1291.12	6452411	54.014	231742	395.793	4611600	94.867	58700
3/30/98	1318.71	6910305	54.502	151880	406.894	5718900	94.935	73100
3/31/98	1312.05	5758357	53.976	121693	404.368	4706300	93.1	74800
4/1/98	1324.96	5854051	53.834	210573	407.51	5092100	92.295	66100
4/2/98	1340.54	9860172	52.802	183977	412.357	8886400	90.817	74400
4/3/98	1359	7341045	52.559	174127	418.018	6585600	91.243	76000

#N/A: Not available

APPENDIX 3

STOCK PRICE AND TRADING VOLUME IN THE SHANGHAI AND THE SHENZHEN STOCK EXCHANGES ONE MONTH BEFORE AND AFTER U.S.-CHINA SUMMIT

	Shanghai A shares		Shanghai B shares		Shenzhen A shares		Shenzhen B shares	
Date	Price (RMB)	Volume	Price (US$)	Volume	Price (RMB)	Volume	Price (US$)	Volume
5/25/98	1471.98	8419160	48.039	78269	462.911	7885100	92.778	137500
5/26/98	1472.97	7215480	48.358	106031	463.393	6987300	94.066	214900
5/27/98	1483.16	7674185	47.483	114525	465.989	7497800	95.203	180000
5/28/98	1481.63	6864535	46.922	121380	463.676	6938700	92.495	150000
5/29/98	1496.33	7792885	46.014	109628	466.824	6332300	92.586	75700
6/1/98	1501.3	8259932	45.379	118576	470.056	7345000	92.377	57300
6/2/98	1498.54	5981507	45.553	88560	469.657	6192200	92.008	72500
6/3/98	1505.21	6039708	47.319	327111	471.994	5697600	92.184	84800
6/4/98	1491.18	5931242	45.742	401820	468.164	5697900	92.781	70000
6/5/98	1493.94	6318031	45.103	238240	468	5878000	92.102	69000
6/8/98	1488.61	5499367	45.288	80408	467.635	5220000	91.477	50300
6/9/98	1452.22	5859354	44.755	89866	452.683	5785100	89.764	69500
6/10/98	1451.47	4480132	43.134	130684	454.279	3986100	86.661	81200
6/11/98	1429.66	3445939	42.353	157041	444.402	3322700	83.896	59100
6/12/98	1467.82	4495188	41.58	130276	458.481	4266700	83.651	69200
6/15/98	1449.34	4566404	40.73	96950	450.659	3963300	80.826	57000
6/16/98	1431.9	4706821	39.444	114937	446.688	3979900	80.727	63600
6/17/98	1431.86	3766521	40.421	147680	445.057	2965200	80.87	46600
6/18/98	1450.26	3685394	42.584	161178	450.798	3219400	83.753	44400
6/19/98	1477.7	4483901	43.554	158142	457.813	3739200	84.752	44400
6/22/98	1484.89	5615062	43.032	73409	458.403	4646600	85.397	34300
6/23/98	1483.87	5581087	41.935	64160	457.171	4398800	85.14	20300
6/24/98	1488.1	5275852	41.55	108921	458.891	4042000	84.833	39500
6/25/98	1466.9	4027710	41.607	109029	451.726	3649600	82.989	33700
6/26/98	1470.81	4256880	41.482	51127	449.818	3449900	83.569	27900
6/29/98	1445.07	3904669	40.893	46599	438.569	3049600	82.22	29800
6/30/98	1421.24	2965235	40.767	36263	431.939	2675800	81.641	15700
7/1/98	1396.79	3985067	40.764	37467	426.073	3248600	81.641	#N/A
7/2/98	1413.12	3658963	40.788	60084	432.841	3299900	81.588	54500
7/3/98	1416.84	3876156	40.825	121386	433.568	4061700	80.453	54900
7/6/98	1395.58	3756701	40.672	53331	423.551	2823200	79.321	28200
7/7/98	1405.38	2623927	40.664	77829	425.518	2301400	79.88	33800
7/8/98	1421.04	2666978	40.696	59286	430.306	2388800	79.799	38400
7/9/98	1426.04	2825071	39.685	107821	431.085	2427600	79.505	37100
7/10/98	1444.79	3473948	39.511	94608	438.918	3264900	78.82	43500
7/13/98	1443.26	3855580	38.553	78993	438.163	3499731	77.684	35375
7/14/98	1420.19	4198541	36.618	135392	429.868	3752946	75.742	61341
7/15/98	1419.32	3566457	35.902	211776	430.747	2914837	73.956	43557
7/16/98	1408.72	3557232	35.99	128659	425.406	2961731	72.588	52086
7/17/98	1396.5	3897078	37.129	202028	421.642	3085792	73.645	50456
7/20/98	1366.74	3660809	37.289	45507	412.125	2975860	74.085	18583
7/21/98	1394.74	3209411	36.967	48467	422.623	2635806	74.268	20919
7/22/98	1380.09	2827092	36.413	49158	417.291	2669214	73.556	32501
7/23/98	1398.93	2729200	35.369	104979	423.493	2717268	72.077	40412
7/24/98	1410.49	3263648	34.869	143880	429.054	3493684	71.766	221685

#N/A: Not available

APPENDIX 4

STOCK PRICE AND TRADING VOLUME IN THE SHANGHAI AND THE SHENZHEN STOCK EXCHANGES ONE MONTH BEFORE AND AFTER THE CHINESE EMBASSY BOMBING IN YUGOSLAVIA

	Shanghai A shares		Shanghai B shares		Shenzhen A shares		Shenzhen B shares	
Date	Price (RMB)	Volume	Price (US$)	Volume	Price (RMB)	Volume	Price (US$)	Volume
4/8/99	1279.9	5783285	27.748	154210	383.229	5178153	56.1	177099
4/9/99	1282.49	7285615	28.413	283083	381.867	5263742	58.54	264655
4/12/99	1272.04	7905334	28.221	182464	377.987	5787561	57.502	164587
4/13/99	1254.05	5558146	27.19	230579	374.062	4374683	56.72	116822
4/14/99	1257.61	4181978	27.225	118420	375.816	3771660	58.847	146488
4/15/99	1245.53	4969618	28.137	227731	370.404	4313548	63.459	307019
4/16/99	1240.99	4764804	27.728	204834	368.25	4062759	60.295	353564
4/19/99	1233.92	4284395	27.261	195460	367.659	3758187	58.794	250397
4/20/99	1246.89	4282824	27.407	111238	371.017	3467968	58.037	227697
4/21/99	1217.62	4545362	26.666	241114	364.761	4295008	55.461	142591
4/22/99	1210.16	5269496	26.416	225525	363.156	5399318	56.779	140605
4/23/99	1213.09	4017967	27.051	344235	368.089	5973159	57.76	384358
4/26/99	1183.98	3739929	26.794	115063	362.302	6037387	57.132	90146
4/27/99	1161.38	3512560	26.677	102275	354.344	4808413	55.605	83465
4/28/99	1160.72	3294902	26.694	87371	352.192	3918729	54.267	91636
4/29/99	1187.94	3577152	26.6	245419	359.034	3497842	53.838	51146
4/30/99	1192.67	2932354	26.907	200277	361.679	3142798	55.355	54293
5/3/99	1192.67	#N/A	26.907	#N/A	361.679	#N/A	55.355	#N/A
5/4/99	1182.66	2760730	27.306	140494	359.414	2701531	56.188	70992
5/5/99	1187.9	2496433	28.083	298969	360.182	2416594	56.565	72287
5/6/99	1199.31	2927055	29.837	513484	363.827	2877977	58.15	240671
5/7/99	1191.07	3686283	30.334	415118	360.163	3074175	57.223	123784
5/10/99	1139.57	4599032	28.107	482420	343.609	3940302	53.068	171052
5/11/99	1164.34	2892399	29.179	214633	350.578	2753633	54.187	171759
5/12/99	1168.66	2642882	30.664	462249	350.271	2339189	55.164	79992
5/13/99	1156.79	2340408	30.457	412707	346.227	2116938	56.132	57438
5/14/99	1129.72	3239488	29.481	244838	336.598	2870275	55.369	33823
5/17/99	1132.11	2406157	29.61	128842	335.165	2231673	55.643	39286
5/18/99	1126.21	2194303	29.112	111370	333.772	1896780	55.125	47059
5/19/99	1178.9	4198157	29.497	132558	350.131	3654320	55.596	62840
5/20/99	1220.33	7132059	29.592	243699	360.646	5956660	55.927	66030
5/21/99	1243	9210428	29.337	200851	364.554	7521668	56.305	51752
5/24/99	1290.26	1335387	31.774	566910	379.6	11396297	57.96	185904
5/25/99	1278.45	1501165	32.377	555274	375.607	11797225	58.268	386767
5/26/99	1313.92	1102450	32.699	319526	386.067	9412783	57.931	102409
5/27/99	1363.64	1637434	34.463	730100	400.24	13505691	60.505	196739
5/28/99	1356.75	1513196	35.921	901114	397.938	11080668	65.498	386097
5/31/99	1357.95	1522862	38.712	787330	397.957	13790536	71.954	590058
6/1/99	1391.25	1254205	42.017	1330124	407.403	11782797	77.6	961068
6/2/99	1367.2	1547819	38.679	1553000	401.992	13162734	74.079	1027130
6/3/99	1346.34	1092904	38.201	1285448	396.757	9482333	77.121	598609
6/4/99	1364.29	9717884	39.629	800608	404.862	9095248	83.503	932076
6/7/99	1407.69	1166442	41.004	658334	416.844	10568999	89.065	784120
6/8/99	1415.49	1260019	40.631	719041	419.886	11429264	88.976	1038214

#N/A: Not available

APPENDIX 5

STOCK PRICE AND TRADING VOLUME IN THE SHANGHAI AND THE SHENZHEN STOCK EXCHANGES ONE MONTH BEFORE AND AFTER CHINA'S WTO ENTRY

	Shanghai A shares		Shanghai B shares		Shenzhen A shares		Shenzhen B shares	
Date	Price (RMB)	Volume	Price (US$)	Volume	Price (RMB)	Volume	Price (US$)	Volume
10/15/99	1641.39	3295753	39.862	183274	490.1	2909630	78.134	112105
10/18/99	1596.43	2926754	39.176	57584	477.249	2617337	78.134	#N/A
10/19/99	1563.82	2632237	38.129	98450	465.791	2451374	73.867	91458
10/20/99	1579.54	2402200	38.903	63630	469.366	1955177	73.947	50387
10/21/99	1550.51	2872441	38.207	45777	458.353	2661631	72.91	37817
10/22/99	1591.72	3953454	39.675	141322	471.641	3614129	76.45	92746
10/25/99	1560.53	2488085	39.319	61810	463.474	2464421	76.24	49201
10/26/99	1575.77	2583049	39.874	107599	469.023	2440712	78.036	126735
10/27/99	1633.27	5875402	41.455	207073	485.71	4967227	82.412	202870
10/28/99	1609.68	4516847	40.594	87139	478.612	3515512	80.496	85524
10/29/99	1599.04	3638549	40.454	92069	475.516	2966438	80.085	197809
11/1/99	1586.9	2628163	40.04	47947	470.704	2205002	77.196	84901
11/2/99	1580.87	2395846	40.018	35684	469.836	1840164	75.882	90605
11/3/99	1568.3	2328173	39.811	29780	467.315	1854884	75.634	65465
11/4/99	1556.7	2598183	39.668	51391	462.703	2520464	77.001	57261
11/5/99	1556.89	2388124	40.286	83228	463.011	2344866	78.362	306923
11/8/99	1562.95	2139186	41.652	147327	467.323	2562186	83.492	229650
11/9/99	1555.42	2109119	40.746	141785	465.006	2446229	80.597	156828
11/10/99	1540.32	4488938	41.293	127075	460.32	3965892	82.943	221239
11/11/99	1533.64	2543235	41.218	146785	457.87	2635291	82.765	159375
11/12/99	1540.65	2038147	40.904	105500	458.92	2115994	82.515	90982
11/15/99	1541.83	2589970	41.203	160856	458.278	2265577	86.594	234221
11/16/99	1520.18	3913351	41.123	382767	453.319	3590063	85.891	317125
11/17/99	1553.75	3107620	41.622	160852	461.862	3141291	86.249	255804
11/18/99	1574.58	5234983	42.324	174888	469.328	5675722	87.595	269861
11/19/99	1559.84	3219597	41.641	155616	465.067	2563325	86.094	127216
11/22/99	1555.71	2912822	41.548	88060	463.198	2889802	84.94	73942
11/23/99	1558.03	2246567	40.632	149405	465.13	2228200	84.168	101158
11/24/99	1545.85	2098946	39.168	180459	461.624	1955141	83.18	72444
11/25/99	1534.94	2542407	38.704	181172	458.291	2488336	81.93	72018
11/26/99	1535.52	2345211	37.909	137240	459.201	2214102	82.319	44986
11/29/99	1525.84	2469369	37.85	109852	455.522	2570444	82.076	57625
11/30/99	1525.2	2097780	38.155	126895	455.669	1991451	81.82	79843
12/1/99	1538.12	2369691	38.421	104888	460.437	2203173	83.372	93903
12/2/99	1526.15	2765841	38.069	77852	456.066	2827957	82.696	76785
12/3/99	1527.65	2584577	38.067	53204	456.413	2437702	82.515	68316
12/6/99	1516.74	2635299	37.886	104500	453.85	2379632	81.73	63909
12/7/99	1518.28	2533233	37.391	107340	454.372	2018708	81.179	66487
12/8/99	1514.91	2790105	36.601	109661	452.755	2077934	78.512	120363
12/9/99	1506.51	2396422	35.745	135093	450.311	2312464	78.644	67038
12/10/99	1519.47	2879325	36.129	156319	455.132	2634842	79.622	118888
12/13/99	1506.67	3013947	36.427	57637	450.859	2712611	80.279	64834
12/14/99	1512.22	2636661	36.367	37986	453.946	2503358	80.231	51173
12/15/99	1542.78	5414682	37.253	175966	462.019	4878530	82.876	374868

#N/A: Not available

APPENDIX 6

STOCK PRICE AND TRADING VOLUME IN THE SHANGHAI AND THE SHENZHEN STOCK EXCHANGES ONE MONTH BEFORE AND AFTER THE MACAU HANDOVER

	Shanghai A shares		Shanghai B shares		Shenzhen A shares		Shenzhen B shares	
Date	Price (RMB)	Volume	Price (US$)	Volume	Price (RMB)	Volume	Price (US$)	Volume
11/19/99	1559.84	3219597	41.641	155616	465.067	2563325	86.094	127216
11/22/99	1555.71	2912822	41.548	88060	463.198	2889802	84.94	73942
11/23/99	1558.03	2246567	40.632	149405	465.13	2228200	84.168	101158
11/24/99	1545.85	2098946	39.168	180459	461.624	1955141	83.18	72444
11/25/99	1534.94	2542407	38.704	181172	458.291	2488336	81.93	72018
11/26/99	1535.52	2345211	37.909	137240	459.201	2214102	82.319	44986
11/29/99	1525.84	2469369	37.85	109852	455.522	2570444	82.076	57625
11/30/99	1525.2	2097780	38.155	126895	455.669	1991451	81.82	79843
12/1/99	1538.12	2369691	38.421	104888	460.437	2203173	83.372	93903
12/2/99	1526.15	2765841	38.069	77852	456.066	2827957	82.696	76785
12/3/99	1527.65	2584577	38.067	53204	456.413	2437702	82.515	68316
12/6/99	1516.74	2635299	37.886	104500	453.85	2379632	81.73	63909
12/7/99	1518.28	2533233	37.391	107340	454.372	2018708	81.179	66487
12/8/99	1514.91	2790105	36.601	109661	452.755	2077934	78.512	120363
12/9/99	1506.51	2396422	35.745	135093	450.311	2312464	78.644	67038
12/10/99	1519.47	2879325	36.129	156319	455.132	2634842	79.622	118888
12/13/99	1506.67	3013947	36.427	57637	450.859	2712611	80.279	64834
12/14/99	1512.22	2636661	36.367	37986	453.946	2503358	80.231	51173
12/15/99	1542.78	5414682	37.253	175966	462.019	4878530	82.876	374868
12/16/99	1525.67	3558147	36.564	70470	456.075	3716350	81.423	82485
12/17/99	1509.27	3248885	36.485	44257	450.784	3192839	80.739	56908
12/20/99	1509.27	#N/A	36.485	#N/A	450.784	#N/A	80.739	#N/A
12/21/99	1483.75	2876146	35.709	61726	443.175	2752913	80.062	57466
12/22/99	1475.11	3035619	35.911	33507	440.331	2915422	80.345	49680
12/23/99	1455.56	2966365	36.401	79711	433.824	3306447	80.76	49336
12/24/99	1440.26	2437954	36.854	37262	428.932	2550269	81.376	50925
12/27/99	1429.46	2787208	37.015	39634	425.003	3301674	81.376	#N/A
12/28/99	1433.21	2787527	36.935	48026	425.625	2743067	82.458	70047
12/29/99	1441.73	2933658	37.412	44562	428.663	2623811	83.907	79824
12/30/99	1451.9	2143676	37.911	68835	431.836	2031419	84.662	121197
12/31/99	1451.9	#N/A	37.911	#N/A	431.836	#N/A	84.662	#N/A
1/3/00	1451.9	#N/A	37.911	#N/A	431.836	#N/A	84.662	#N/A
1/4/00	1494.5	4271152	38.151	99781	445.317	3909157	86.51	147252
1/5/00	1498.05	6700377	38.148	180508	446.881	5868925	84.063	152267
1/6/00	1555.95	7924318	38.981	166136	465.34	7157095	86.217	110123
1/7/00	1611.81	1560457	40.684	393292	482.54	14083370	90.783	361530
1/10/00	1642.53	1470541	40.303	348566	492.983	13941301	90.487	282909
1/11/00	1572.84	12670970	39.231	149761	472.84	10904023	86.905	167282
1/12/00	1528.36	1001348	38.389	145722	459.731	8011418	86.726	121396
1/13/00	1513.88	6238071	38.148	89535	456.723	4991141	86.349	100014
1/14/00	1497.269	5136479	37.839	68248	451.726	4276588	84.862	76458
1/17/00	1523.519	5266027	37.869	77959	459.294	4671667	85.53	73059
1/18/00	1516.34	5955745	37.827	89546	459.689	5388304	85.426	103871
1/19/00	1531.216	5250217	38.503	130595	466.474	5301234	85.563	89906
1/20/00	1559.172	6930692	38.73	182128	474.486	7523850	85.618	98059

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